

Invasive Species Early Detection Monitoring Protocol for Klamath Network Parks

Standard Operating Procedures (SOP) #5: Field Survey Methods

Version 1.00 (February 2010)

Revision History Log:

Previous Version #	Revision Date	Author	Changes Made	Reason for Change	New Version #

This SOP details field data collection methods to be used in this protocol. Field data collection is completed using electronic and manual means. The core staffing for the field data collection will be two GS-5 level seasonal employees who will be trained by and work closely with the Crew Lead and Project Lead. To prepare for field data collection, each member of the crew, or supplemental staff, will attend training on how to use the electronic equipment to collect data (SOP #3: Observer Training). It is the responsibility of the Crew Lead to ensure that the seasonal crew members are proficient in all the field data collection, entry, and management methods before going into the field.

Selecting Sampling Sites

Monitoring of prioritized species will occur along roads, trails, and powerline corridors. Roads will include those in campgrounds. Prior to visiting a park, the Crew Lead will develop a list of segments that will be sampled that year. These segments will be randomly selected from all sampling units within the sampling frame developed by the GIS Specialist (SOP #2: Field Work Preparation). Busy roads will not be sampled due to safety concerns.

The roads, trails, and powerlines will be divided into 3 km segments (Figure 1). In some instances, segments will be shorter than 3 km, for example, where the total distance of a road, trail, or powerline is less than 3 km, or where the division of the road, trail, or powerline into 3 km segments creates a terminal section that is shorter than 3 km. Each 3 km segment will be divided into 500 m long subsegments (Figure 1). There will be some cases where roads or trails themselves are less than 500 m. In addition, where segments are less than 3 km for reasons discussed above, there will be a subsegment that is shorter than 500 m. These will be treated the same as 500 m subsegments. The subsegments will be numbered 1-6 with increasing distance from the trailhead in each 3 km segment. Segments shorter than 3 km will be numbered accordingly, but will have fewer than six subsegments. Starting points for segments may be at the discretion of the field crew, depending upon the most likely points of access to the segment

from the existing road and trail network. In campgrounds, crews will walk all roads, and investigate all vacant sites. The width of segments will generally be 20 m on either side of the road or trail.

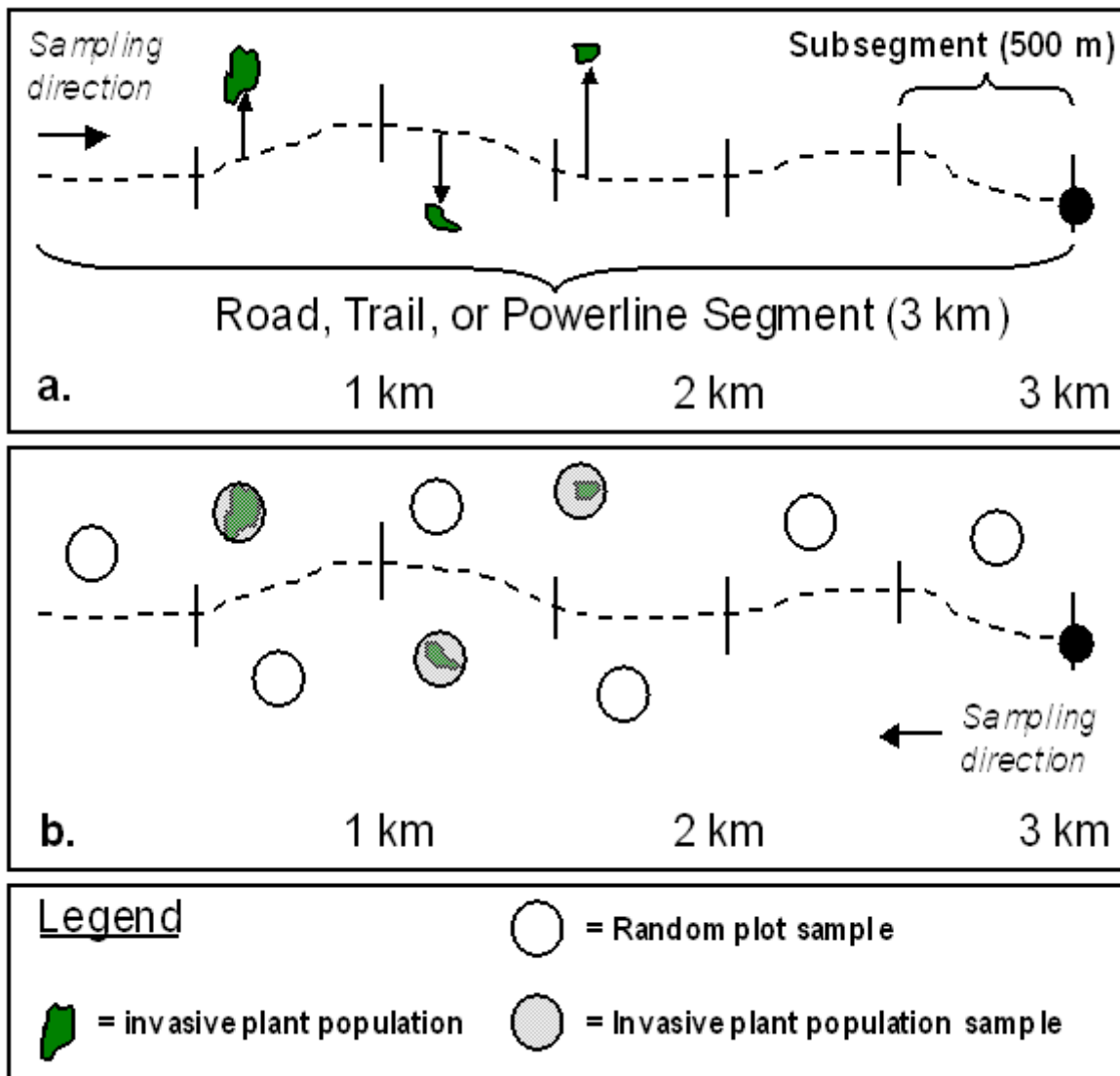


Figure 1 a and b. Illustration of the invasive species early detection response design to be completed at each randomly selected road, trail, or powerline segment in a park: a) location mapping and sampling of invasive plant populations; and b) plot sampling of random locations and the invasive plant populations located.

Collecting Occurrence Data

Data will be collected using a Trimble GeoExplorer Pocket PC (or similar product). Hardcopy datasheets will also be used (see Figure 2 at the end of this protocol) and Garmin units will serve as a backup for obtaining geographic coordinates and for navigation when a signal for the Trimble unit cannot be obtained (SOP #6: Data Collection and Entry). GIS shapefile templates for recording information described below will be pre-loaded onto the Trimble unit prior to field sampling (SOP #2: Field Work Preparation, SOP #4: Setting Up The Electronic Field Equipment, and SOP #9: Databases). GIS data loaded on the Trimble and Garmin units include:

background imagery, roads and trails, streams and lakes, and sampling units color coded by subsegment.

Starting with the first subsegment of a road, trail, or powerline corridor, the field crews will walk, searching for prioritized invasive species. In most areas, prioritized species are in the colonization and establishment phases of invasion (SOP #1: Invasive Plant Prioritization). In remote areas and park designated weed free zones, infestations of species in the equilibrium phase will also be recorded if found (SOP #1: Invasive Plant Prioritization).

As the crew hikes the segment, a GPS record of the location of all prioritized species observed from the route will be recorded in the Trimble unit, as well as on paper datasheets. Infestations will be considered distinct if they are separated by the maximum detection distance of 20 m. Detection distance will not be consistent among segments because this will vary with vegetation. Detection distance will be high where ground vegetation is minimal and low where ground vegetation is dense (e.g., in dense chaparral). Recording changes in detection distance was not considered feasible, and the pilot study affirmed this. The distance from the road, trail, or powerline corridor to the infestation will be determined using a laser rangefinder. For every occurrence of a priority species, a minimal amount of data will be collected as described in the data collection section below.

Based on the 2009 sampling season, there will rarely be four or more infestations of early detection species along a subsegment. In the exceptional cases where more than four infestations do occur, it is very time-consuming to map them. Thus, the maximum number of individual infestations per 500 m subsegment per species will be four. If there are more, the whole segment will be considered infested, suggesting to managers that the entire segment be searched and treated for the species found. If the crew should encounter more than four infestations, this will be recorded in the observation in the notes section on the back of the last datasheet under infestation #5 and in the site notes section on the Trimble unit. All other infestations (#5 and above) of that species in that 500 m subsegment will be ignored.

Should the species occur in a continuous pattern, the distance between plot sampling start and end points for the continuous population will be recorded in the note's field of the GPS and no infestation size will be recorded. In this case, center points will be at least 40 m apart (20 m on each side of a plot center). If the infestation is continuous along both sides of the trail, a random side will be chosen for an infestation plot center. In a "worst case" scenario, the crew will have mapped 24 infestations of a single species on a 3 km segment. From these 24 mapped infestations, three are randomly selected to have site data recorded.

Sampling will proceed until the end of the segment is encountered. Once the survey has been completed, crews will walk back along the route they surveyed and collect additional data at random and infestation plots.

Plot Sampling

The circular 100 m plots will be laid out by stretching two tapes out to 11.34 m, the diameter of a 100 m² circle. The tapes will be crossed at their middle and placed perpendicular to one another. The edges of adjacent plots will be a minimum of 20 m apart.

Random Plots

Crews will place one circular 100 m² plot randomly in each subsegment, except in campgrounds, where plots will not be sampled. The random plots will document conditions in uninfested areas to aid with future invasive species habitat modeling. Plots will be located based on the following. First, a random side of the road or trail will be selected for sampling. A random number between 6 m and 494 m will then be selected for the longitudinal coordinate. This will ensure the entire plot is placed longitudinally within the proper subsegment. Then a random number between 6 m and 14 m will be selected for the transverse coordinate to ensure that a portion of the plot does not fall on the sampled segment. The coordinate will be the distance from road or trail edge of the plot center. These numbers will be identified ahead of time, even prior to the field season, and can be reused.

Infestation Plots

Additional circular 100 m² plots will be centered on infestations of priority species, excluding any equilibrium species that may be documented in remote and/or weed free areas. The number of infestation plots to be sampled will depend on the number of infestations encountered along the segment. The maximum number of plots for each invasive species prioritized for monitoring will be three. There are a number of different scenarios for locating these plots:

1. For each invasive in which there are three or fewer infestations on a segment, a plot will be centered on each infestation, regardless of the location of the infestation, or the segment length.
2. For each invasive in which there are more than three infestations on a segment, a total of three will be chosen to sample. One each will be chosen randomly from infestations in subsegments 1, 3, and 5 if possible. If the distribution of infestations does not allow for this, sampling sites will be chosen to maintain their dispersion by randomly selecting two sites from the two most far apart subsections containing infestations. The third site would then be located randomly in one of the remaining subsections containing infestations.
3. If infestations are only found in two subsections, all three sampling locations would be selected at random from these.
4. If all infestations of an invasive are located in one subsegment, sampling plot locations will be chosen at random from among the separate infestations.

To choose infestations randomly, each infestation is numbered in sequential order. A random number from the appropriate range, depending on the considerations described above, will be selected using the seconds output from a digital watch or a random number table.

Data Collection

The database being used to collect data for this project was developed using the Natural Resource Database Template (NRDT) and incorporates several features currently being used in The Nature Conservancy's Weed Information Management System (WIMS) (SOP #9: Database). For this project, we will use a Trimble Pocket PC and ArcPad to collect data while in the field. The ArcPad setup on the Trimble unit includes forms that incorporate pick lists, auto-populated fields, and domain values to ensure that data are being collected in an efficient and accurate manner (SOP #6: Data Collection and Entry). The following sections list the general

data that will be collected as part of this protocol. For more detailed information about the data, see the data dictionary in SOP #9: Databases.

All Infestations

The following parameters will be entered into the Pocket PC for all infestations encountered.

1. Name of the park.
2. Name of feature (road, campground, trail, powerline).
3. The subsegment where the infestation is located.
4. Unique name of the infestation in the format: 4 digit park code_yyyymmdd_hhmmss (e.g. 20070913_054603).
5. Calendar date at time of data collection, input format is yyyymmdd.
6. List of crew involved in sampling the site, first name and last name.
7. GPS unit used to collect the location of the infestation.
8. GPS error associated with the location.
9. Latitude and Longitude.
10. Scientific name and common name of the observed species.
11. Distance from the road, trail, or powerline corridor to the infestation (record value from laser rangefinder).
12. Infestation size, chosen from one of the following:
 - a. $< 1 \text{ m}^2$
 - b. $1\text{-}25 \text{ m}^2$
 - c. $> 25 \text{ m}^2$
13. Whether or not the invasive species was treated.

Plot Sampling

At infestation plots, all the parameters listed in the above section will be recorded. However, for random plots, only parameters 1-9 will be recorded. In addition, for each random plot, and for plots located at infestations, the following parameters will be recorded.

1. Type of plot that is being measured. There are two possible options:
 - a. Infestation plot
 - b. Random plot
2. If the plot was selected to collect vegetation parameters at its location.
3. Slope of the plot measured as a percent using a clinometer (field crew will be trained in methodology).
4. Aspect in compass degrees facing out from site clinometer (field crew will be trained in methodology).
5. Percent cover of the priority invasive species in the plot. This is an ocular estimate. Supposing a view above the plant, foliar cover is the area of ground that would be obscured by the leaf surface area of the plant.
5. Light index measured using a Densiometer total count, average of four cardinal directions.
6. Evergreen tree cover. Percent of plot, ocular estimate.
7. Deciduous tree cover. Percent of plot, ocular estimate.
8. Shrub cover. Percent of plot, ocular estimate.
9. Herbaceous cover. Percent of plot, ocular estimate.

10. Litter, woody debris. Percent of plot, ocular estimate.
11. Bare ground. Percent of plot, ocular estimate.
12. Rock. Percent cover of bedrock and/or rocks bigger than 15 cm in diameter.
13. Estimated average height of the most dominant three species of canopy trees. Selected from the following list:
 - f. 0.5-5 m
 - g. 5.1-10 m
 - h. 10.1-20 m
 - i. 20.1-30 m
 - j. >30 m
14. Percent of soil disturbance in the plot, ocular estimate.
15. Percent of surface water in the plot, ocular estimate.
16. Type of surface water found within survey site. Select from the list below. If no surface water is observed, then upland should be used.
 - a. **Flooded Permanently or Semi-Permanently:** Surface water persists throughout all or almost all the year in all years. Vegetation is composed of obligate hydrophytes.
 - b. **Seasonally/Temporary:** Surface water is present for portions of the growing season, but the water table usually lies well below the soil surface for most of the season.
 - c. **Seep:** Site of low volume groundwater discharge. Ponded water may or may not be present.
 - d. **Upland:** Surface water present only during heavy precipitation.
17. Land use is recorded if the plot has historically been altered for one of the following uses:
 - a. Cultivation
 - b. Campground
 - c. Ditch / diversion
 - d. Graded
 - e. Pasture
 - f. Logging
 - g. Mining
 - h. Homestead
 - i. Roads

Additional data that are used to create field maps (these data are automatically associated with infestation and random sites once they are loaded into the desktop database):

1. State and County.
2. USGS 7.5 minute topographic map.
3. Public Land Survey System locations.

Treatment of Invasive Species

One of the primary goals of this project is to survey trails, roads (including those in campgrounds), and powerline corridors to record occurrence data and associated habitat information to be used for analysis (SOP #10: Reporting and Analyses of Data). It is neither the goal of this project nor the responsibility of the Inventory and Monitoring Program to eradicate

observed invasive species. The primary management contributions of this monitoring effort will be to provide occurrence data, statistical summaries, and field observations in a timely fashion to support more substantive park or Network-based treatment efforts. Therefore, a major responsibility of the Crew Lead is to report any known locations of a priority species to the Park Contact in a timely manner and to maintain close communication with park managers throughout the year.

Completion of Field Work

The attribute form on the Trimble unit should be examined immediately after completing the electronic forms to make sure all fields have been populated. Hardcopy datasheets should be reviewed before leaving the monitoring segment to make certain they are complete. At the end of the field day, data are transferred electronically through an automated process from the Pocket PC to an Access database located on the desktop computer. Once the data have been transferred, the field crew should compare the hardcopy datasheets to the forms in the Access database to make sure they match. Errors should be corrected immediately following the process outlined in SOP #6: Data Collection and Entry. At the end of a park-specific sampling trip, it is the responsibility of the field crew to transfer all data (databases, datasheets, GIS layers, pictures, and metadata) to the Crew Lead. It is the Crew Lead's responsibility to follow the data management methods and guidance outlined in the KLMN Data Management Plan and SOP #9: Databases, prior to transferring products to the Data Manager following methods in SOP #8: Data Transfer, Storage, and Archiving.

KLMN INVASIVE MONITORING PROJECT			
Date: _____ <small>(YYYYMMDD)</small>		Site Type Infestation / Random <small>(Circle One)</small>	
Is this a Randomly Selected Infestation site?		Yes / No <small>(Circle One)</small>	
GPS Unit Trimble XM / Trimble XT / Garmin 76CSx / Other <small>(Circle One)</small>			
Accuracy:		Trimble PDOP: _____ Garmin Ept: _____ ft	
Lat:		Long:	
Park Unit: _____			
Trail / Road/ Power Line: _____			
Segment: Seg 1 / Seg 2 / Seg 3 / Seg 4 / Seg 5 / Seg 6 <small>(Circle One)</small>			
Crew: _____ <small>(Last Name, First Name)</small>			
Data Recorder: _____ <small>(Last Name, First Name)</small>			
Scientific Name: _____			
Infestation % _____ <small>(% of plot)</small>		Infestation distance (m) _____ < 1 sq meter / 1 - 25 sq meter / >25 sq meter <small>(Circle One)</small>	
Infestation Size:			
Phenology: Bolting / Bud / Dead / Flowering / Mature / Rosette / Seed Set / Seedling <small>(Circle One)</small>			
Infestation controled Y/N			
Macro Position Top = apex, hill, or ridge top. • Up = upper 1/3 of a hillslope. • Mid = middle 1/3 of a hillslope. • Low = lower 1/3 of a hillslope. • Bot = bottom of a hillslope adjoining a valley		Micro Position Convex• Concave• Straight• Undulating	
Plot Slope: _____ %		Plot Aspect: _____ Degrees	
Hydrology: Flooded Perm-Semi perm/ Seasonally-Temporary /Seep / Upland <small>(Circle One)</small>			
Land Use: Cultivated / Campground / Ditch / Graded / Pasture / Logging / Mining / Homestead /			

Roads /Burn			
Evergreen:	_____	%	Deciduous: _____ %
Herbaceous:	_____	%	Shrub: _____ %
Woody Debris:	_____	%	Litter: _____ %
Bare Ground:	_____	%	Light Index: _____ %
Soil Disturbance: _____ %		Surface water % _____	
Avg Height of canopy species (m) _____		.5-5;5.1-10;10.1-20;20.1-30;>30	
Red = All Infestation, Bold = Random Selection			
Page _____ or _____ for Trail			

KLMN INVASIVE MONITORING PROJECT
Comments About the Visit to the Segment

Figure 2. The invasive species early detection field datasheet.